

International Transactions in Measures of the Nation's Production

LARGER international transactions and sharp changes in relative prices have made estimates of national income and product more sensitive to the choice of concepts and methodologies adopted for international transactions than they had been before 1973. This article discusses several aspects of the treatment of net exports of goods and services in the national income and product accounts (NIPA's).

The first of the article's three parts describes the reasoning behind series that, by a change in the way in which net exports are deflated, introduce the effect of changes in the relationship between export and import prices. Series of this type—called command series—measure the amount of goods and services over which a country has command as a result of its current production. They are introduced as counterparts to the BEA series for GNP, net national product (NNP), and national income (NI). An appendix reviews the literature on two topics—the choice of deflators for deriving command series, and the emergence of command series to supplement production series. The second part of the article discusses the scope and deflation of international flows of factor income in the context of two concepts of national income and product, the “factor nationality” and “national gain” concepts. Focus is on two changes made in the recent comprehensive revision of the NIPA's: the addition of reinvested earnings of incorporated foreign affiliates to the factor income flows, and the use of the deflator for net domestic product to de-

flate the factor income flows. The third part describes the sources and estimating techniques used to deflate the remaining components of exports and imports, highlighting the limitations

stemming from the use of unit value indexes for end-use categories in the deflation of merchandise trade and summarizing the variety of price data used in the deflation of services.

The Terms of Trade and Deflation of Net Exports

THE Nation's production, as measured in the NIPA's, consists of domestic use of product (personal consumption expenditures, private domestic investment, and government purchases of goods and services) plus net exports of goods and services (exports minus imports).¹ To obtain the constant-dollar value of net exports, BEA deflates the current-dollar value of exports by export prices and the current-dollar value of imports by import prices. Net exports in constant dollars are then calculated by subtracting deflated imports from deflated exports. By this procedure, changes in the prices of exports and imports do not directly affect the measure of real production. Thus, the value of production in constant dollars is not altered directly by a change in the terms of trade, which is the ratio of the prices of exports of goods and services to the prices of imports of goods and services.² (It may, of course, be affected by the indirect economic effects of such changes.)

Although a rise in the price of imports relative to the price of exports does not directly change real production, it does reduce the quantity of foreign goods and services the country can purchase with the proceeds from any given quantity of exports.³ This effect is taken into account in series that may be called “command over goods and services resulting from current production.”⁴ A “command” counterpart to each of the BEA production measures

2. In this article “terms of trade” refers to the terms of trade on goods and services. If $P_x(t)$ is an index of the prices of a country's exports of goods and services, including factor incomes, during a specified period, t , and $P_m(t)$ is an index of the prices of a country's imports of goods and services, including factor incomes, the terms of trade on goods and services may be expressed as $T_e(t) = 100 [P_x(t)/P_m(t)]$. Kemp distinguishes six concepts of the terms of trade, of which this is the second; he calls it the “terms of trade on current account.” (*International Encyclopedia of the Social Sciences*, 1968 ed., s.v. “International Trade: Terms of Trade,” by M. C. Kemp.)

3. With given real production, the country must curtail either domestic use of product or net foreign investment (or transfers to abroad). In current prices, exports are equal to the sum of imports, net foreign investment, net transfer payments to foreigners, interest paid by government to foreigners, and capital grants paid by the United States (net).

4. The author has previously used this term to describe such series in *Why Growth Rates Differ: Pastoral Experience in Nine Western Countries* (Washington, D.C.: The Brookings Institution, 1967, p. 30) and *Accounting for Slower Economic Growth: The United States in the 1970s* (Washington, D.C.: The Brookings Institution, 1979, pp. 11–12). The term is admittedly clumsy and will usually be shortened in this article to “command over goods and services” or “command.” For a discussion of other terminology, see “Production, Command, and Terminology Relating to Them” in the appendix.

1. Private domestic investment is measured gross of depreciation in GNP and net of depreciation in NNP; other components, including exports and imports, are identical in the two series. NI, like NNP, measures net output, but NI values each product at the factor cost of producing it, whereas NNP (like GNP) values products at their market price. Consequently, the two series value exports and imports, like other output components, differently. The method of measuring NI is such that factor cost values for most product components, including exports and imports, are not calculated separately.

Note.—Isalah Frank, Robert Z. Lawrence, Walter S. Salant, and several persons within BEA provided helpful comments.

in constant dollars can be obtained by changing the procedure for deflating net exports. Instead of subtracting deflated imports from deflated exports, net exports in current dollars are divided by an appropriate price index. As explained later, an import price index is used for the series introduced in this article, but results would differ little if an export price index or a general index of prices were substituted. (Deflation of net exports by import prices is equivalent to two other procedures that are sometimes advocated.* For a review of the literature, see "Deflators for Deriving Command Series" in the appendix.) When net exports are zero in current dollars, they are, of course, also zero in constant dollars by this alternative procedure regardless of the price index used, whereas they may take a large positive or negative value by the procedure used in measuring real production.

Arithmetic example

A simplified example in which GNP, NNP, and NI are the same will clarify the difference between production and command. In the first year, a country produces 100 bushels of wheat valued at \$3 a bushel. It consumes 80 bushels worth \$240 and exports 20 bushels worth \$60. It also consumes 80 barrels of oil, which it imports at \$2 a barrel for \$60. GNP is \$300, consisting of 100 bushels of wheat production valued at \$3 a bushel. Statistically, GNP of \$300 is obtained as the sum of domestic consumption of wheat (\$240) and oil (\$60) plus net exports of zero (exports of \$60 less imports of \$60).

In the second year, the price of oil

5. One of these procedures is to obtain real net exports by deducting imports deflated by import prices from exports also deflated by import prices. The other is to multiply BEA's real exports by a percentage equal to the index of the terms of trade and deduct BEA's real imports. The three equivalent procedures for obtaining net exports in constant dollars may be expressed as

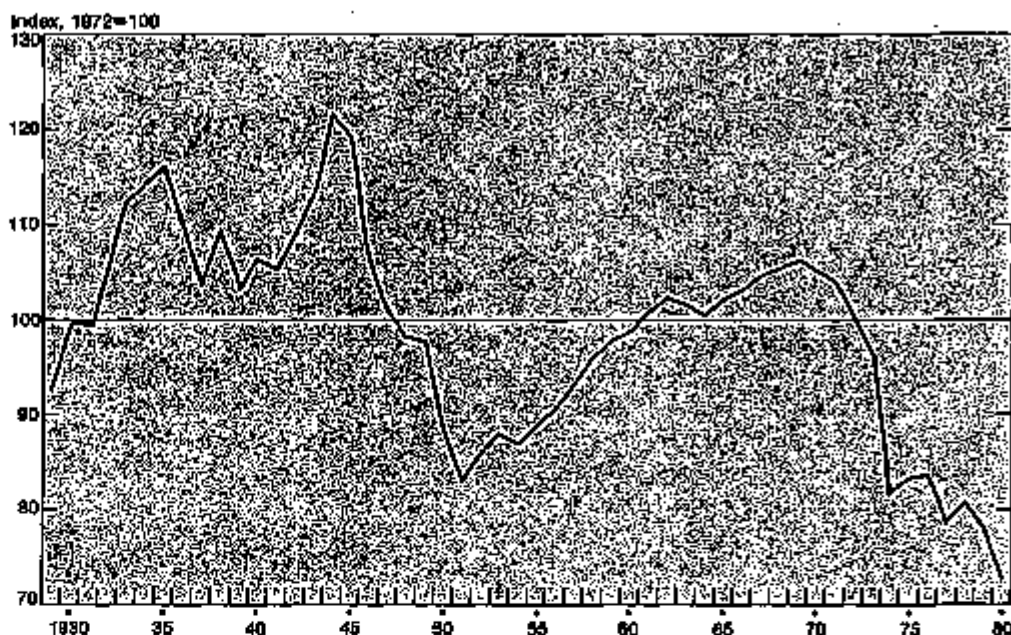
$$(1) \quad \frac{V_x - V_m}{P_m};$$

$$(2) \quad \frac{V_x}{P_m} - \frac{V_m}{P_m}; \text{ and}$$

$$(3) \quad \left(\frac{V_x}{P_x} \cdot \frac{P_x}{P_m} \right) - \frac{V_m}{P_m}$$

when P and V stand for price and value, and x and m for exports and imports.

Terms of Trade on Goods and Services, 1929-80



U.S. Department of Commerce, Bureau of Economic Analysis

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has risen to \$4 a barrel. The country continues to import 30 barrels of oil, but must now pay \$120 for them. To earn this amount, it now exports 40 bushels of wheat, which is still valued at \$3 a bushel, for \$120. The country still produces 100 bushels of wheat, so it has only 60 bushels left for its own consumption.

GNP in current dollars remains \$300 in the second year, consisting of 100 bushels of wheat production valued at \$3 a bushel. Statistically, GNP of \$300 is the sum of domestic consumption of \$180 of wheat (60 bushels at \$3) and \$120 of oil (30 barrels at \$4) plus net exports of zero (exports of \$120 less imports of \$120).

BEA procedures would also show GNP unchanged at \$300 in constant dollars of the first year. The rationale for the finding of no change in production is obvious: Production in both years consists of 100 bushels of wheat. Statistically, second-year GNP of \$300 in constant (first year) dollars is obtained as the sum of domestic consumption of \$180 of wheat (60 bushels at \$3) and \$60 of oil (30 barrels at \$2) plus net exports of \$60. Net exports are the difference between exports of \$120 (40 bushels of wheat at \$3 a bushel) and

imports of \$60 (30 barrels of oil at \$2 a barrel).

The country, nevertheless, is worse off in the second year than in the first. It consumes less wheat and only the same amount of oil, and in neither year did transactions on current account yield future claims against foreign countries or foreign claims against this country. The series for command over goods and services recognize this deterioration. In these series, the value of net exports in constant dollars in the second year is obtained by dividing current-dollar net exports by a price index. Net exports in current dollars are zero, so net exports in constant dollars necessarily are also zero, regardless of the price index used. Command over goods and services valued in dollars of the first year is therefore \$240, obtained as domestic consumption of \$180 of wheat (60 bushels at \$3) and \$60 of oil (30 barrels at \$2) plus net exports of zero.

The divergence between GNP, which is unchanged, and its counterpart series for command, which fell 20 percent, is due to a drop in the index of the terms of trade; the index fell 50 percent, as the export price index was unchanged while the import price index doubled.

Uses of production and command series

The events in the arithmetic example can be described by stating that the country's production (GNP, NNP, or NI) has not changed, but that its command over goods and services resulting from production has declined as a result of deterioration in the terms of trade. This description suggests that two sets of measures are needed. One set is the present BEA series for GNP, NNP, and NI, which are obtained by separate deflation of exports and imports, and the other set is the counterpart series, which are obtained by deflating net exports. The command counterparts to the present series are introduced in this article. (For a review of literature, see "Production, Command, and Terminology Relating to Them" in the appendix.)

The need for two sets of series can be brought out by illustrating their distinctive uses. Four illustrations will be provided. The first two refer in rather general terms to the production and command series themselves, and the second two refer to the price indexes for production and command.

1. For analysis of productivity, the production measures, not their command counterparts, are appropriate. In the example, all of the country's production consisted of wheat, and wheat production did not change. Suppose that labor and other inputs into wheat production also were unchanged. In such a case it is natural and convenient to say that productivity does not change. The decline in command is to be ascribed to worsened terms of trade.⁶

6. The difference between productivity changes occurring in production of the goods and services a country imports and productivity changes in production of goods and services it exports is among the influences governing long-term changes in the terms of trade. Solomon Fabricant ("Notes on the Deflation of National Accounts," in *Studies in Social and Financial Accounting, Income and Wealth*, ser. 3, ed. Phyllis Deane, International Association for Research in Income and Wealth, London: Bowes and Bowes, 1961, p. 52) states that, other things constant, we may expect that the bigger a country's productivity increase the smaller will be the gain from changes in the terms of trade. "Other things" must include productivity change abroad. Consequently, to analyze reasons for changes in the terms of trade, it becomes necessary to analyze reasons for international and interproduct differences in productivity change. If "command" were substituted for production in the productivity cal-

2. The measures of command over goods and services are appropriate when the change in a particular use of goods and services is to be compared, in real terms, with the change in the total amount of goods and services available to a country for its use. For example, if one is appraising changes in the burden of defense purchases, in real terms, it is appropriate to compare defense purchases with command rather than with production. (It should be noted, however, that current-dollar measures are often appropriate for comparisons of a change in a particular use with a change in a total, and that, in current dollars, production and command are the same.)

3. In their simplest and most general form, the wage-price guideposts as formulated in the early 1960's stated that, given a stable labor share in GNP, price stability will be attained if compensation per hour rises at the same rate as real GNP per hour worked. The promise of the guideposts was that if everyone behaved in accord with them, price stability—in terms of GNP prices—would be attained without hurting anyone in real terms.⁷ However, even if everyone had behaved this way, prices paid by domestic purchasers, as measured by the price index for command over goods and services, would have risen 3.4 percent since 1969, because the terms of trade deteriorated. It surely is these prices that people have in mind when they think of price stability. Assuming an unchanged labor

calculation, the terms of trade would affect U.S. productivity and the sources of productivity change abroad would become part of domestic productivity analysis, which is very inconvenient. (Denison, *Why Growth Rates Differ*, pp. 30-31.)

In theory, use of the "double factorial terms of trade" would eliminate this particular problem. It is the product of the ordinary terms of trade index and the ratio of an index of productivity in production of exports to productivity in production of imports. But these productivity indexes do not exist.

7. The guideposts up to 1968 are discussed in Edward F. Denison, *Guideposts for Wages and Prices: Criteria and Consistency*, W. S. Woytinsky Lecture no. 2, Department of Economics, Institute of Public Policy Studies (Ann Arbor, The University of Michigan, 1968), and in works by John Sheahan, Robert Solow, and others that are cited there. The guidepost relationship holds equally well for any target rate of price change if the difference between the target rate of change in prices and that in compensation per hour equals the rate of change in output per hour.

share of GNP, hourly labor compensation could have risen only as much as command per hour worked if stability in prices paid by domestic purchasers were to be attained.

4. Because income tax laws usually provide a fixed dollar amount of personal exemptions and a progressive rate structure, inflation raises income tax revenues by a percentage that exceeds the increase in money income that it creates. As a consequence, the greater the rise in money income created by inflation since the tax structure was established, the higher is the ratio of government revenue from income taxes to current-dollar national income or product. Unless exemptions, brackets, or rates are changed, inflation automatically increases the government share of the national income at the expense of the shares of the taxpayers. To prevent such an increase, some countries and several States in the United States have indexed their income tax systems.

If the objective is to make the government share of the national income invariant to inflation, the most appropriate price index for use in indexation of income taxes is the implicit deflator for national income. The corresponding price index for command over goods and services is inappropriate (as is an index for consumption).⁸ The inappropriateness of the latter is brought out by the following example. If import prices rise, the money income of residents (consumers and other domestic buyers of final products) is unchanged, but the prices they pay rise to cover the higher import costs. The NI deflator is unchanged but that for command rises. With money income unchanged, indexing by use of the deflator for command would push taxpayers into lower brackets and cause their income tax liability to decline absolutely and as a share of national income.

Comparison of production and command

GNP in constant dollars, its counterpart command series, and the ratio of

8. Edward F. Denison, "Price Series for Indexing the Income Tax System," in *Inflation and the Income Tax*, ed. Henry J. Aaron (Washington, D.C.: The Brookings Institution, 1976), pp. 258-59.

command to GNP are shown in columns 5 to 7 of table 1. Similar series for NI and its counterpart command series are shown in columns 18 to 20.* The

D. To conserve space, series for NNP are not shown in table 1. The ratios of command to production on an NNP basis are the same as those shown

command series rise or fall relative to

in column 20 for NI. The NI ratios were actually computed on an NNP basis. Specifically, in the absence of separate factor cost values for exports and imports, the command counterpart to NI was computed on the assumption that the ratio of command to production was the same for NI as for NNP.

their production counterparts if the terms of trade improve or worsen.

1969 to 1980.—The terms of trade have been moving against the United States since 1969 (chart 2). Computed with 1972=100, the index of the terms

Table 1.—Gross National Product, National Income, Command Over Goods and Services, Terms of Trade, and

(Values in billions of dollars. Implicit deflators are indexes with 1972=100. Quarterly estimates are seasonally adjusted at annual

Line	Year and quarter	Series on gross national product (GNP) basis														Terms of trade ²	
		Series in current prices				Series in constant (1972) prices						Implicit price deflators					
		GNP	Exports	Imports	Net exports	GNP	Command	Ratio of col. 6 to col. 5 ¹	Exports	Imports	Net exports		GNP	Command	Exports		Imports
											In GNP	In command					
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1	1929	103.4	7.0	5.9	1.1	315.7	314.5	0.9962	16.7	12.9	3.7	32.5	32.9	42.2	45.5	92.7	
2	1930	90.7	5.4	4.4	1.0	285.6	285.5	0.9996	14.2	11.4	2.8	27.7	27.8	31.8	35.7	90.6	
3	1931	76.1	3.6	3.1	0.5	253.5	253.4	0.9996	11.7	10.0	1.7	21.7	21.9	25.9	31.2	99.4	
4	1932	58.3	2.5	2.1	0.4	227.1	227.7	1.0022	9.3	8.3	1.0	16.0	16.6	20.6	25.0	106.4	
5	1933	55.8	2.4	2.0	0.4	222.1	223.3	1.0060	8.3	8.6	0.3	15.5	16.0	20.6	25.6	112.3	
6	1934	65.8	3.0	2.4	0.6	230.1	240.5	1.0038	9.7	9.0	0.7	20.9	21.1	27.1	30.5	114.2	
7	1935	72.5	3.2	3.1	0.1	260.0	261.7	1.0068	10.5	11.8	-1.3	21.3	21.7	27.7	31.0	116.1	
8	1936	82.7	3.5	3.4	0.1	293.5	293.7	1.0026	11.2	11.9	-0.7	22.0	22.8	27.8	31.6	110.1	
9	1937	90.8	4.7	4.3	0.4	310.2	310.8	1.0018	14.0	13.2	0.8	1.4	20.30	23.2	33.5	104.0	
10	1938	85.0	4.4	2.0	1.2	298.7	297.9	1.0043	13.5	10.3	3.2	4.5	20.04	28.5	32.5	106.4	
11	1939	90.9	4.6	3.4	1.2	319.8	326.3	1.0016	14.3	10.9	3.4	3.9	20.45	28.4	32.1	103.5	
12	1940	100.0	5.4	3.6	1.8	344.1	345.1	1.0029	15.5	11.1	4.4	5.4	20.05	29.0	34.9	106.4	
13	1941	122.0	6.1	4.7	1.5	400.4	401.3	1.0022	16.4	13.2	3.2	4.1	31.23	31.2	37.8	105.4	
14	1942	158.5	5.0	4.6	0.4	481.7	482.7	1.0022	11.4	12.0	-0.6	4.4	34.33	34.2	43.6	108.0	
15	1943	182.1	4.6	6.5	-1.9	531.6	532.9	1.0023	9.8	13.7	-3.9	-4.6	38.14	36.1	46.8	112.3	
16	1944	210.6	5.5	7.2	-1.7	589.1	571.4	1.0040	10.5	16.8	-6.3	-6.0	37.01	36.9	51.9	121.5	
17	1945	213.4	7.4	7.9	-0.5	580.4	583.0	1.0048	13.0	17.6	-4.7	-1.1	37.91	37.7	59.6	119.4	
18	1946	208.8	15.1	7.3	7.8	478.3	480.2	1.0040	27.3	14.0	13.3	15.1	43.88	43.7	55.4	106.0	
19	1947	238.1	20.2	8.3	11.9	470.3	470.6	1.0005	37.3	13.3	24.0	19.1	49.55	48.5	62.8	100.8	
20	1948	259.5	17.5	10.5	6.9	488.8	489.3	0.9988	26.8	15.5	11.3	10.8	52.98	52.0	67.8	98.1	
21	1949	258.3	16.8	9.8	6.5	482.2	481.6	0.9988	25.3	15.2	10.7	10.1	52.49	52.5	63.1	97.7	
22	1950	286.5	14.4	12.2	2.2	534.5	532.1	0.9950	24.6	17.7	6.9	3.2	53.54	53.5	61.0	98.7	
23	1951	330.8	19.7	13.3	6.4	579.4	574.6	0.9917	28.0	18.5	9.5	5.4	57.09	57.6	68.8	98.3	
24	1952	348.0	19.1	15.9	3.2	600.8	604.8	0.9934	27.9	20.0	7.9	4.0	57.92	58.3	70.9	95.8	
25	1953	368.8	18.0	15.7	2.3	623.6	620.4	0.9949	26.6	21.8	4.8	1.6	58.32	59.1	70.7	98.0	
26	1954	366.8	18.7	16.2	2.5	618.1	612.4	0.9941	27.8	20.9	6.9	3.2	59.55	59.9	72.2	97.0	
27	1955	400.0	21.0	18.0	3.0	657.3	654.1	0.9946	30.7	23.4	7.3	2.9	60.84	61.2	77.1	98.8	
28	1956	421.7	25.0	19.8	5.2	671.6	668.2	0.9962	35.3	25.2	10.1	6.7	63.78	63.1	71.0	90.8	
29	1957	444.0	28.1	20.8	7.3	683.2	681.1	0.9981	38.0	28.1	9.9	9.1	64.98	65.2	74.0	93.0	
30	1958	489.7	24.2	21.0	3.2	680.9	679.8	0.9981	33.2	27.6	5.6	4.8	66.04	66.2	73.1	96.1	
31	1959	487.9	24.5	28.4	1.4	721.7	723.9	0.9989	33.8	31.1	2.7	1.9	67.60	66.7	73.5	97.7	
32	1960	506.5	28.9	23.4	5.5	737.2	735.8	0.9983	38.4	30.7	7.7	7.2	68.70	68.7	75.1	96.8	
33	1961	524.8	29.9	22.3	6.6	768.6	760.0	1.0044	39.3	28.0	11.3	8.5	69.33	69.3	76.1	100.8	
34	1962	543.0	21.8	21.4	0.4	800.3	801.3	1.0013	41.8	34.8	7.0	8.6	70.61	70.6	74.2	102.4	
35	1963	584.7	24.2	20.6	3.6	832.5	833.3	1.0008	44.8	33.4	11.4	10.1	71.67	71.6	78.3	101.5	
36	1964	637.7	38.8	28.8	10.1	876.4	876.6	1.0003	50.3	37.3	13.0	13.1	72.77	72.7	79.8	100.5	
37	1965	691.1	41.1	32.3	8.8	929.3	930.5	1.0012	51.7	41.6	10.1	11.3	74.36	74.3	77.7	102.2	
38	1966	734.9	44.8	38.1	6.6	984.8	986.6	1.0018	54.4	47.9	6.5	6.3	76.76	76.6	81.9	103.1	
39	1967	799.8	47.3	41.0	6.3	1,011.4	1,012.9	1.0025	56.7	51.3	5.4	7.9	78.08	78.9	83.5	104.5	
40	1968	873.4	52.4	48.1	4.3	1,058.1	1,061.5	1.0032	61.2	59.8	1.4	5.2	82.84	82.3	85.5	105.4	
41	1969	944.0	57.3	53.3	4.0	1,087.4	1,091.7	1.0038	65.8	64.1	1.7	3.9	86.79	86.5	88.5	106.4	
42	1970	992.7	65.7	59.0	6.7	1,063.6	1,068.3	1.0039	70.5	68.1	2.4	7.6	91.45	91.3	93.2	106.2	
43	1971	1,077.4	68.8	64.7	4.1	1,122.4	1,123.2	1.0026	71.0	69.3	1.6	4.4	96.01	95.8	97.0	104.0	
44	1972	1,153.9	77.5	78.7	-1.2	1,153.9	1,153.9	1.0000	77.5	79.7	-2.2	-1.7	100.00	100.0	100.0	100.0	
45	1973	1,236.4	102.8	85.4	17.4	1,255.0	1,251.6	0.9973	97.3	81.6	15.5	12.2	105.09	105.0	112.7	98.6	
46	1974	1,494.2	148.2	132.8	15.4	1,488.0	1,488.4	0.9993	105.5	90.7	14.8	8.1	114.92	114.6	124.7	91.8	
47	1975	1,548.2	154.9	128.1	26.8	1,288.8	1,216.6	0.9860	108.6	71.4	37.2	14.0	123.66	123.3	144.6	83.3	
48	1976	1,713.0	170.9	157.1	13.8	1,300.4	1,282.4	0.9862	110.1	84.7	25.4	7.4	122.11	124.6	133.3	84.7	
49	1977	1,918.0	193.3	187.5	6.8	1,371.7	1,347.7	0.9826	113.2	91.8	21.4	-2.1	129.83	142.3	161.9	78.6	
50	1978	2,186.1	218.8	220.4	-1.6	1,436.9	1,412.1	0.9827	127.5	103.0	24.6	-3.3	130.05	162.7	172.4	80.8	
51	1979	2,413.0	281.3	267.9	13.4	1,483.0	1,450.3	0.9782	140.9	108.2	32.7	5.6	162.77	160.4	191.5	78.0	
52	1980	2,626.1	298.9	316.8	-17.9	1,483.7	1,436.7	0.9703	141.1	108.1	33.0	8.0	177.36	182.8	211.8	72.7	
53	1977: I	1,830.1	178.3	180.5	-2.2	1,245.9	1,222.5	0.9826	111.3	89.0	22.3	-1.1	138.04	139.1	160.2	72.0	
54	II	1,892.9	185.4	187.4	-2.0	1,263.4	1,240.0	0.9829	114.1	91.7	22.4	-1.0	138.91	141.3	162.5	70.6	
55	III	1,950.4	187.5	187.7	-0.2	1,265.8	1,230.7	0.9810	115.6	90.5	25.0	-0.1	140.78	143.3	162.2	73.2	
56	IV	1,988.6	191.9	194.4	-2.4	1,391.3	1,367.6	0.9828	111.7	92.9	17.9	-6.0	142.91	145.4	163.5	78.6	
57	1978: I	2,032.4	195.9	206.2	-10.3	1,402.3	1,377.7	0.9835	112.3	95.8	16.7	-3.9	144.33	147.8	165.6	79.2	
58	II	2,139.8	214.8	218.1	-3.3	1,432.8	1,408.2	0.9828	123.4	102.4	21.0	-1.6	148.69	151.2	171.3	80.6	
59	III	2,190.5	226.3	224.3	2.0	1,446.7	1,421.5	0.9826	123.6	103.7	19.9	-2.2	151.42	154.1	173.5	80.6	
60	IV	2,271.9	248.6	232.9	11.4	1,465.8	1,434.5	0.9829	139.4	106.2	33.2	5.2	154.89	157.7	178.2	81.6	
61	1979: I	2,340.6	258.1	233.2	24.9	1,478.8	1,452.6	0.9834	141.1	105.1	36.0	8.7	158.35	161.1	183.7	80.7	
62	II	2,374.6	266.8	238.6	28.2	1,473.4	1,445.3	0.9859	140.6	108.8	31.6	3.6	161.17	164.9	188.6	79.8	
63	III	2,444.1	298.1	273.2	24.9	1,488.2	1,464.3	0.9772	151.3	110.2	41.1	7.3	164.23	168.1	192.7	77.5	
64	IV	2,493.3	306.3	294.7	11.6	1,490.6	1,461.3	0.9736	154.8	112.6	42.2	2.9	167.47	172.0	197.8	74.6	
65	1980: I	2,571.7	327.3	316.3	11.0	1,501.9	1,454.7	0.9694	165.9	115.6	50.1	2.9	171.33	176.8	206.4	71.6	
66	II	2,564.8	322.3	316.3	6.0	1,493.3	1,417.5										

of trade (table 1, column 16) fell 83.7 percentage points from 1969 to 1980.¹⁰ Almost three-fourths of this amount had been lost by 1973.¹¹ Well over four-fifths was lost in the year 1974, a result of the first large petroleum price in-

crease. Nearly all of the remainder—almost one-fourth of the 11-year loss—occurred in 1979 and 1980, when petroleum prices were again rising sharply.

Since 1972, the prices of both exports and imports of goods and services have risen more than the price of GNP (columns 12, 14, and 15). In 1980, the export deflator stood at 211, the import deflator at 290, and the GNP deflator at 177. Prices of almost all major components of both exports and imports had risen substantially more than the GNP deflator; the only exceptions were exports of nondurable consumer goods and nonfactor services, and factor incomes received and paid.¹² If the GNP deflator is used as a standard, therefore, prices in almost all import groups had contributed to deterioration in the terms of trade and prices in almost all export groups had helped to limit the deterioration.

Based on direct comparison of export and import prices, two-thirds of a 27-percent deterioration in the terms of trade from 1972 to 1980 resulted from the price of petroleum imports rising more than that of other imports. The 1980 deflator for imports of petroleum and products (1972=100) was 1,154 and that for imports of all other goods and services 232 (table 2, columns 3 and 4). If prices of petroleum imports had increased by the same percentage as those of all other imports, the terms of trade would have worsened only one-third as much after 1972 as was actually the case (columns 5 and 6).

The deterioration in the terms of trade from 1969 to 1972, unlike that in the later period, cannot be ascribed to

petroleum. In 1969-72, the price of petroleum increased a little less than the price of other imports and not much more than the price of exports.

Because of the deterioration in the terms of trade, the ratio of command to production has fallen (chart 3). In other words, command has increased less than production. Annual rates of growth from 1969 to 1980 were 2.84 percent for GNP in constant dollars and 2.58 percent for the corresponding command series, a difference of 0.31 percentage points. (Over shorter periods differences were often much larger. For example, command grew 1.4 percentage points less than production from the third quarter of 1973 to the third quarter of 1974, and again from the first quarter of 1979 to the first quarter of 1980. Even bigger differences appeared in individual quarters.) Differences between the growth rates of NI and its command counterpart are a little larger than those between GNP and its command counterpart. Thus, from 1969 to 1980, the growth rate of NI was 2.58 percent and that of its command counterpart 2.18 percent, a difference of 0.35 points.

From the first quarter of 1979 to the first quarter of 1980, it may be observed, real NI in 1972 dollars, seasonally adjusted at annual rates, rose \$12 billion whereas the corresponding series for command fell \$6 billion. Real GNP rose \$22 billion but its command counterpart rose only \$2 billion in this period.

1929 to 1969.—From 1929 to 1969, international trade was small relative to the Nation's production and in the postwar portion of that timespan the terms of trade fluctuated less than they have more recently. As a result, differences between measures of command and of production were generally small. The terms of trade were more favorable in most of the 1930's and 1940's, and less favorable in the 1950's, than they were in the 1960's, but over those 41 years the ratio of command to production on a GNP basis varied only from 0.9917 in 1951 to 1.0066 in 1935, a range of 1.5 percent, and in 1947-69 the range was only 1.3 percent. On a NI basis, the range was 1.7 percent in 1929-69 and 1.3 percent in 1947-69. The 1929-69

10. Factor incomes, as explained in the next part of this article, are deflated by the net domestic product deflator and one might choose to exclude them from the terms of trade calculations. This would change the 1980 index, shown as 72.7, to 72.3, and the index exclusive of petroleum imports, shown in table 2 as 90.0, to 92.4. These differences are too small to affect the interpretation of changes.

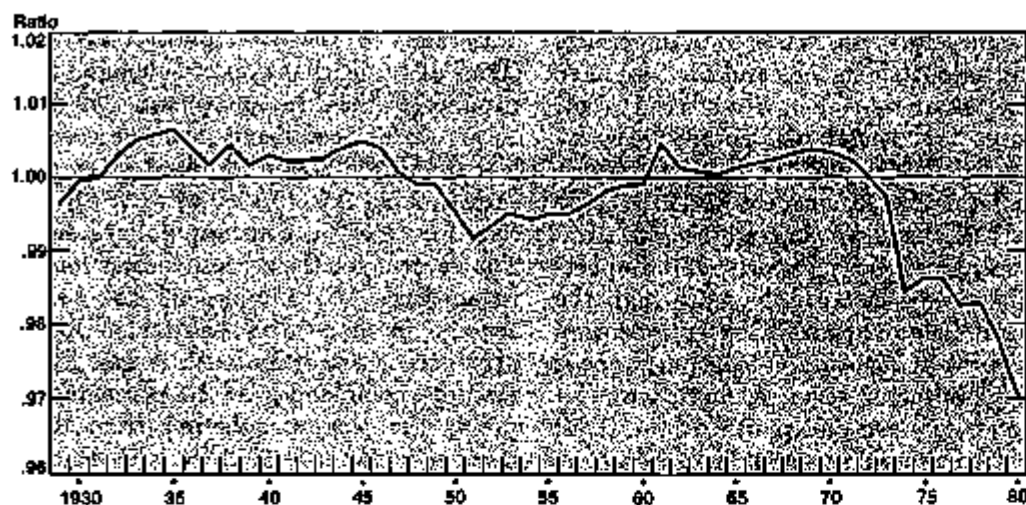
11. The OPEC embargo affected petroleum prices in the last quarter of 1973 but had little effect on the 1973 annual index of the terms of trade. The annual index would have been 96.4 instead of 96.2 if the index had been the same in the fourth quarter as in the third.

12. This statement is based on the classifications of commodity exports and imports by end-use categories, for which deflators are shown in NIPA table 7.17 in this issue, and the factor incomes and other services components of exports and imports of services, for which deflators are shown in NIPA table 7.18.

Related Series, 1929-80

Series on national income (NI) basis						Line
Series in current prices: NI	Series in constant prices			Implicit deflators		
	NI	Command	Ratio of col. 19 to col. 18 ¹	NI	Command	
(17)	(18)	(19)	(20)	(21)	(22)	
84.8	255.1	254.0	0.9858	32.2	33.4	1
73.5	230.9	230.8	0.9999	32.0	32.0	2
66.7	206.1	204.0	0.9897	28.1	28.5	3
42.4	173.4	172.9	1.0032	24.5	24.4	4
28.0	158.6	163.5	1.0054	23.7	25.5	5
48.4	183.6	184.9	1.0066	26.5	26.3	6
55.4	205.4	207.0	1.0075	27.5	27.3	7
94.2	234.7	234.7	1.0043	27.5	27.4	8
72.4	234.4	233.9	1.0050	28.0	28.9	9
55.0	225.7	226.5	1.0049	28.0	27.9	10
71.4	255.9	256.0	1.0018	27.9	27.9	11
79.7	278.2	279.0	1.0062	28.7	28.6	12
102.7	332.2	333.0	1.0024	30.9	30.8	13
135.9	394.7	396.4	1.0024	34.3	34.3	14
180.3	456.8	458.1	1.0026	36.3	36.3	15
182.1	452.6	459.7	1.0043	36.9	36.7	16
180.7	450.6	453.0	1.0030	37.6	37.4	17
178.6	452.1	453.9	1.0043	44.4	44.3	18
194.0	380.7	389.9	1.0006	50.0	50.0	19
219.9	410.0	410.4	0.9993	53.5	53.6	20
213.6	406.6	406.2	0.9987	51.5	52.0	21
227.6	432.2	430.8	0.9945	53.7	54.0	22
274.1	478.5	474.2	0.9910	67.2	67.7	23
287.9	480.1	493.6	0.9829	57.7	58.1	24
302.1	510.7	513.9	0.9945	56.3	55.9	25
301.1	505.0	505.4	0.9986	60.4	60.8	26
330.5	512.3	510.2	0.9949	60.6	61.2	27
349.4	548.0	554.0	0.9945	62.6	63.0	28
355.2	503.3	502.8	0.9957	64.6	64.9	29
345.9	538.3	557.2	0.9979	64.7	65.8	30
400.6	580.2	585.5	0.9889	67.2	67.3	31
415.7	609.7	608.2	0.9953	68.2	68.2	32
428.8	622.5	622.2	1.0005	68.9	68.9	33
483.0	657.4	658.3	1.0014	70.3	70.2	34
483.5	664.9	665.5	1.0009	71.3	71.3	35
534.9	724.2	724.4	1.0003	72.5	72.4	36
572.4	770.9	771.0	1.0014	74.3	74.2	37
628.1	810.0	817.5	1.0019	77.0	76.8	38
652.2	836.4	838.7	1.0027	70.2	70.0	39
722.5	877.4	880.4	1.0034	82.3	82.1	40
779.2	898.5	902.3	1.0041	85.6	86.3	41
810.7	888.8	892.1	1.0026	91.2	90.9	42
871.3	911.8	914.3	1.0027	93.6	93.3	43
953.6	963.7	963.7	1.0000	100.0	100.0	44
1,068.2	1,024.2	1,021.2	0.9971	105.1	106.4	45
1,180.7	1,079.9	992.3	0.9829	114.9	117.0	46
1,280.4	1,088.9	973.5	0.9843	123.3	127.3	47
1,378.2	1,043.2	1,029.1	0.9847	132.0	134.0	48
1,546.5	1,164.9	1,083.6	0.9607	140.0	142.7	49
1,745.4	1,158.3	1,136.2	0.9809	150.7	152.6	50
1,963.3	1,190.5	1,167.7	0.9779	164.1	168.1	51
2,121.4	1,184.5	1,145.5	0.9670	179.1	185.2	52
1,477.3	1,079.2	1,053.5	0.9806	130.6	132.2	53
1,522.8	1,069.8	1,076.0	0.9910	138.9	141.5	54
1,576.0	1,118.3	1,093.9	0.9800	140.9	143.8	55
1,612.4	1,125.0	1,103.7	0.9810	142.3	146.1	56
1,644.0	1,132.2	1,111.3	0.9804	145.1	148.0	57
1,720.7	1,154.5	1,132.7	0.9811	148.0	151.9	58
1,771.7	1,162.9	1,141.5	0.9808	152.2	155.2	59
1,844.6	1,181.3	1,159.0	0.9816	155.1	159.1	60
1,903.6	1,195.0	1,170.7	0.9797	159.3	162.0	61
1,922.0	1,190.3	1,163.2	0.9789	162.3	165.6	62
1,996.2	1,199.5	1,180.2	0.9748	165.0	169.9	63
2,031.3	1,201.3	1,180.1	0.9706	169.1	174.2	64
2,083.9	1,209.9	1,184.9	0.9682	173.1	179.3	65
2,070.0	1,170.0	1,128.0	0.9652	170.8	183.2	66
2,122.4	1,173.1	1,135.7	0.9681	180.9	186.9	67
2,204.8	1,187.8	1,151.7	0.9659	183.0	192.4	68
2,286.3	1,208.8	1,171.9	0.9656	189.4	195.3	69

Ratio of Command to Production, GNP Basis, 1929-80



Note.—Based on constant (1972) dollars.

U.S. Department of Commerce, Bureau of Economic Analysis

growth rates of command exceed those of production by 0.02 percentage points. The rates are 3.15 and 3.13 percent, respectively, on a GNP basis and

3.21 and 3.19 percent, respectively, on a NI basis. (These rates are adjusted to eliminate the effect of adding Alaska and Hawaii to the series in 1960.)

The Net Inflow of Factor Income from Abroad

NATIONAL income and product are measured by adding to the value of domestic product (i.e., the value of production attributable to factors of production located in a country) the excess of factor income received from abroad over factor income paid to abroad. The appropriate scope of factor income received and paid depends upon which of two concepts of national income and product is adopted. In Peggy B. Musgrave's terminology, these are the "factor nationality concept," according to which world production is allocated among countries in accordance with the residence of the suppliers of the factors of production, and the "national gain concept," in which world production is allocated in accordance with the benefit countries gain from it.¹³ To con-

13. Peggy B. Musgrave, "Foreign Investment in the National Income Accounts," *Review of Economics and Statistics* 59 (May 1977): 220-24. The "national location of production concept" that Musgrave also describes is what BEA measures as domestic product. Musgrave also mentions a "national enterprise concept," which seems unattractive for general use.

form to the latter concept, taxes must be allocated to the country collecting the taxes, usually that in which the factors are located. The following pages describe these concepts and discuss their implications for procedures for the deflation of international flows of factor income. They also explain the changes made in the recent comprehensive revisions of the NIPA's—the addition of reinvested earnings of incorporated foreign affiliates and the use of the deflator for net domestic product to deflate international factor income

It is sometimes suggested that concepts of national production be abandoned entirely and the field be left to concepts of domestic production. Among other reasons, this suggestion is unsatisfactory because domestic production is inconsistent with the criterion that, insofar as practicable, production should be something that it is desirable to maximize when real costs and a variety of other conditions are held constant. If U.S. residents invest abroad at a higher return than they formerly received in the United States, their income is raised. NI should and will rise by the difference between the returns. Domestic income, however, will fall by the whole amount formerly earned in the United States because the new earnings from abroad are not counted.

CHART 3

Table 2.—Implicit Price Deflators and the Terms of Trade, 1967-80

(Index, 1972=100)

Year	Implicit price deflators				Terms of trade	
	Total exports	Imports			Total	Excluding petroleum imports
		Total	Petroleum and products	Excluding petroleum		
	(1)	(2)	(3)	(4)	(5)	(6)
1967	83.5	79.9	87.1	78.5	104.5	106.9
1968	85.5	81.1	89.5	80.8	105.4	106.5
1969	85.5	83.2	85.8	83.1	105.4	106.5
1970	83.2	86.6	85.0	88.7	105.2	106.1
1971	87.0	85.8	85.9	85.2	105.6	104.1
1972	100.0	100.0	100.0	100.0	100.0	100.0
1973	112.7	116.7	127.7	115.7	98.6	97.4
1974	124.7	124.6	119.7	122.8	81.8	84.3
1975	149.0	179.5	139.4	144.2	85.9	86.4
1976	155.2	155.5	159.9	153.5	85.7	87.7
1977	184.9	206.4	197.1	179.8	78.8	83.4
1978	172.4	214.0	198.1	188.5	80.6	81.5
1979	191.5	245.4	202.0	204.6	78.0	82.7
1980	231.0	280.1	1,158.8	232.2	72.7	90.9

flows—and compare the results of the previous and present procedures.

The factor nationality concept

According to the factor nationality concept, world production of goods and services is allocated among countries in accordance with the residence of the suppliers of the factors of production that produced the goods and services. Given unlimited data concerning production, prices, income shares, and residence of property owners and workers, this might be done as follows. To obtain NI in current dollars, the amount that each enterprise in each country adds to the net value of production at factor cost would be divided between property and labor earnings. Property earnings would then be distributed among countries in proportion to the value of the enterprise's property that is owned by residents of each country, and labor earnings according to the residence of the workers to whom earnings accrue.

To obtain NI estimates in constant dollars, the current-dollar estimate of the net value of production at factor cost for each enterprise in each country would be deflated by the customary double-deflation procedure. (According to this procedure, constant-dollar net value of production at factor cost is obtained by deducting the constant-dollar value of intermediate products purchased from the constant-dollar value

of the goods and services produced.) The constant-dollar net value of production of each enterprise in each country would then be allocated among countries in the same proportions as the value that is added in current dollars, because there is no reason for the distributions to differ.

Use of this statistical procedure would imply that within each enterprise the earnings of labor and property are proportional to their marginal products or, if they are not, that the effects of deviations in individual enterprises upon the distribution among countries are offsetting. This is a dubious assumption in some circumstances, but none more suitable for general application is available.

The statistical procedure just described is impractical. The current-dollar result can, however, be obtained by adding to the domestic product of each country the excess of the value added by its factors of production that are abroad over the value added by foreign factors that are located in it. The addition is equal to the inflow of income from abroad minus the outflow to abroad. The trouble with this solution is that it prevents deflation in detail and thus impairs the constant-dollar series.

To obtain a constant-dollar series, the best expedient is to divide both factor income received and factor income paid by the deflator for domestic NI or net domestic product (or some similar broad index of domestic prices). In the case of the United States, international transfers of factor income consist almost entirely of property income; transfers of labor income are small. If foreign investment in the United States is widely distributed among industries (as it is), an appropriately weighted price index for the product ascribable to this investment is likely to move much like a general price index. Moreover, an appropriately weighted price index for the product of U.S. investment abroad is likely to move like a broad index of domestic prices if U.S. investment abroad is widely distributed industrially (as it is, although with certain areas of concentration), and if foreign prices converted to U.S. dollars by

exchange rates move like U.S. prices (as they must tend to do in the long run, although not year by year and still less quarter by quarter). This procedure has the advantage of leaving the implicit price deflators for the national output measures unaffected by international income flows.

The incomes included in the international flows should conform to the definition of production—GNP, NNP, or NI—that is used. If NI is used, the international flows should correspond to the incomes of the factors of production as they are measured in NI. That is, they should be measured inclusive of reinvested earnings of corporations; inclusive of corporate income taxes paid to the host country, taxes withheld on dividends and interest sent abroad, and other taxes on income; inclusive of the inventory valuation and capital consumption adjustments; and exclusive of capital gains and losses. Transfer payments and interest paid by governments should not be included in the international income flows. For NNP, the production entering into the international flows is the same as for NI, but it must be valued at market prices rather than at factor cost. Therefore, the international flows should include indirect business taxes.¹⁴ They should exclude subsidies. For GNP, depreciation may also need to be included in the international flows, but only if GNP is used because a measure of gross production is preferred. If NNP is conceptually appropriate but GNP is used because there are doubts about the accuracy of the capital consumption estimates, the inclusion of capital consumption in international flows may not be indicated because its inclusion would reduce, rather than increase, the statistical accuracy of the series.

14. Suppose an enterprise paid wages of \$80, all to domestic labor; earned profits of \$20, of which \$5 was ascribed to foreign capital because the enterprise was one-fourth foreign-owned; and paid indirect business taxes of \$40 in the form of a value added tax. The foreign owners would be credited with 5 percent of the \$100 of value added at factor cost, and presumably, therefore, also with 5 percent (\$2) of the value added tax. If the indirect tax is a retail sales tax, the nationality of resources in all industries contributing to the retail value of the product must be considered. Allocation of property taxes and subsidies raises other questions that will not be explored.

The national gain concept

The national gain concept proceeds from the premise that only income accruing to the benefit of residents of a country should be included in its national income and product. According to this concept, the allocation in accordance with residence is modified with respect to taxes, which are allocated to the country collecting the taxes. Specifically, international income flows are measured net of all taxes, direct as well as indirect, collected by the host country. The outflow of factor income to abroad is measured net of U.S. taxes paid by foreign investors in the United States, and thus the taxes are part of U.S. income and product. Similarly, the inflow of factor income from abroad is measured net of taxes imposed by the host countries, and thus the taxes are part of the income and product of the host countries. The international income flows appropriate for NNP and NI are the same, because exclusion of all taxes is appropriate for both series.¹⁵ The flow appropriate for GNP is also the same, because on a benefit basis there would be no reason to include recovery of capital, i.e., capital consumption allowances, in the international flows.

With the factor nationality concept, it will be recalled, the conceptually appropriate deflation procedure stemmed from the fact that property income flowing among countries could be viewed as the monetary value of real product being transferred. One way to regard the after-tax property income flows appropriate for the national gain concept is to consider that they, too, are values of real product, but that the amount of product transferred is

15. Subsidies should also be treated the same—i.e., included—in the international flows used to measure NNP and NI. In practice, property income will in any case include little subsidy if the effect of subsidizing a product is to increase its quantity and reduce its price rather than to raise the rate of profit.

Alusgrave does not discuss international flows of transfer payments and government interest under the national gain concept. These flows should not be treated like factor income flows even though they represent an international transfer of purchasing power. GNP, NNP, and NI should be construed as measures of national gain from current production, which requires excluding transfer payments and government interest from the international flows.

smaller than under the factor nationality concept. The appropriate detailed deflation procedure is then the same as for the factor nationality concept. In practice, resort to deflating total inflows and outflows by a single deflator such as that for domestic NI or NNP would again be necessary.

An alternative approach is to regard income from abroad from the standpoint of the U.S. recipient. To such a recipient, the purchasing power of a dollar of income earned abroad is indistinguishable from that of a dollar of income earned in domestic production, provided that currencies are convertible. Similarly, to a U.S. owner or part owner of a domestic firm, it makes little difference whether some of the dollars the firm pays as dividends or interest go abroad or all are paid to U.S. residents. Such considerations suggest obtaining deflated production series by adopting the convention that the ratio of national income to domestic income, or national product to domestic product, is the same in constant dollars as in current dollars. This procedure is the same as deflating international property income flows by the deflator for domestic income or product, so by this alternative as well the national gain concept leads to the same deflation procedure as that suggested as an expedient consistent with the factor nationality concept.

Changes in the treatment of factor income flows

In the recent comprehensive revision of the NIPA's, two major changes were made in the treatment of international factor income flows. One was the addition of reinvested earnings of incorporated foreign affiliates of direct investors, and the other was a change in the procedure used to deflate international factor income flows.

Reinvested earnings.—Prior to the comprehensive revision, the international property income series had omitted the net inflow of reinvested earnings of incorporated affiliates of direct investors. The original reason for the omission had been that data for estimating these earnings had been lacking. Also, the balance of payments accounts

Table 3.—Net Inflow of Factor Income From Abroad Based on Previous and Present Procedures, 1929-80

(Values in billions of dollars)

Year	Current dollars				Constant (1922) dollars					
	Net inflow by previous procedure	Reinvested earnings, net	Net inflow by present procedure	Percentage added to NI by change in procedure	Net inflow by previous procedure	Changes due to—			Net inflow by present procedure	Percentage added to NI by change in procedure
						Deflation procedure	Reinvested earnings, net	Total		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1929	0.5	n.a.	0.5	—	1.9	0.5	n.a.	0.5	2.4	0.2
1930	0.7	n.a.	0.7	—	2.1	0.2	n.a.	0.2	2.3	0.1
1931	0.5	n.a.	0.5	—	1.9	0	n.a.	0	1.9	0
1932	0.4	n.a.	0.4	—	1.7	-0.2	n.a.	-0.2	1.5	-0.1
1933	0.3	n.a.	0.3	—	1.6	-0.2	n.a.	-0.2	1.4	-0.2
1934	0.3	n.a.	0.3	—	1.5	-0.2	n.a.	-0.2	1.3	-0.1
1935	0.4	n.a.	0.4	—	1.4	-0.1	n.a.	-0.1	1.3	0
1936	0.3	n.a.	0.3	—	1.3	-0.2	n.a.	-0.2	1.1	-0.1
1937	0.3	0.2	0.5	0.2	1.0	0	0.5	0.5	1.5	0.3
1938	0.4	0.1	0.5	0.1	1.4	-0.1	0.2	0.1	1.3	0
1939	0.3	0.1	0.4	0.1	1.2	-0.1	0.5	0.4	1.6	0.2
1940	0.4	0	0.4	0	1.3	-0.1	0.1	0.1	1.4	0
1941	0.4	0.2	0.6	0.2	1.2	0	0.5	0.5	1.7	0.2
1942	0.4	0.2	0.6	0.2	1.1	0	0.4	0.4	1.5	0.1
1943	0.3	0.1	0.4	0.1	1.0	0	0.4	0.4	1.4	0.1
1944	0.4	0.1	0.5	0.1	1.0	0	0.4	0.4	1.4	0.1
1945	0.3	0.1	0.4	0.1	0.8	0	0.3	0.3	1.1	0
1946	0.3	0.3	0.6	0.3	1.1	0	0.6	0.6	1.7	0.2
1947	0.8	0.3	1.1	0.3	1.6	0.4	0.6	1.0	2.6	0.3
1948	1.2	0.4	1.6	0.4	1.8	0.4	0.8	1.2	3.0	0.3
1949	1.1	0.3	1.4	0.3	1.9	0.2	0.6	0.8	2.7	0.2
1950	1.3	0.3	1.6	0.3	1.9	0.2	0.6	0.8	3.0	0.2
1951	1.5	0.6	2.1	0.6	1.8	0.2	1.0	1.2	3.0	0.4
1952	1.5	0.6	2.1	0.6	1.8	0.2	1.4	1.6	3.4	0.4
1953	1.5	0.7	2.2	0.7	2.0	0.2	1.1	1.3	3.1	0.3
1954	1.5	0.6	2.1	0.6	2.2	0.2	0.9	1.1	3.3	0.3
1955	2.0	0.8	2.8	0.8	2.5	0.5	1.2	1.7	4.2	0.4
1956	2.2	1.0	3.2	1.0	2.7	0.5	1.6	2.2	4.9	0.4
1957	2.3	1.2	3.5	1.2	2.9	0.7	1.9	2.6	5.5	0.5
1958	2.3	0.8	3.1	0.8	3.0	0.4	1.2	1.6	4.6	0.3
1959	2.4	0.9	3.3	0.9	3.2	0.4	1.3	1.7	4.9	0.3
1960	2.5	1.1	3.6	1.1	3.3	0.4	1.6	2.0	5.2	0.3
1961	3.1	0.8	3.9	0.8	6.1	0.4	1.2	1.6	8.7	0.3
1962	3.6	1.0	4.6	1.0	4.8	0.2	1.4	1.7	6.5	0.3
1963	3.7	1.8	5.5	1.8	4.9	0.2	1.8	2.0	6.9	0.3
1964	4.2	1.1	5.3	1.1	5.7	0.2	1.5	1.8	7.5	0.2
1965	4.7	1.2	5.9	1.2	6.1	0.2	1.6	1.9	7.9	0.2
1966	4.2	1.5	5.7	1.5	6.4	0.1	1.9	2.0	7.4	0.2
1967	4.6	1.3	5.9	1.3	6.9	0	1.7	1.5	7.5	0.2
1968	4.8	2.0	6.7	2.0	6.1	-0.3	2.4	2.1	8.2	0.2
1969	4.5	2.4	6.9	2.4	5.7	-0.4	2.8	2.2	7.9	0.2
1970	4.6	2.7	7.3	2.7	5.4	-0.6	3.0	2.6	8.0	0.3
1971	4.5	2.6	7.1	2.6	7.1	-0.3	2.7	2.4	9.5	0.4
1972	4.9	4.8	9.7	4.8	6.9	0	4.0	4.0	10.9	0.4
1973	5.5	7.2	12.7	7.2	7.3	1.0	5.5	7.8	15.1	0.8
1974	13.1	6.7	19.8	6.7	6.8	4.6	5.9	10.5	17.8	1.1
1975	10.5	6.9	17.3	6.9	4.8	5.5	5.5	9.1	13.8	0.8
1976	14.4	6.0	20.4	6.0	8.8	4.2	4.5	8.8	16.4	0.8
1977	17.8	5.7	23.5	5.7	7.6	5.2	4.1	9.3	18.9	0.8
1978	22.5	9.4	29.9	9.4	8.1	8.7	5.3	12.0	20.1	1.0
1979	28.7	15.1	43.8	15.1	9.1	8.6	9.4	18.1	37.2	1.5
1980	37.1	12.5	49.6	12.5	9.8	12.4	7.1	19.5	39.3	1.7

n.a. Not available.

NOTE.—Columns 1 and 5 exclude the net inflow of reinvested earnings of incorporated affiliates except in 1929. Columns 3 and 9 include this net inflow except in 1929-30, when they exclude it, and 1957-59, when they include the gross inflow but the outflow is not deducted. Beginning with 1957, columns 1 and 5 differ in some years from series published prior to the December 1980 NIPA revisions, because they incorporate statistical revisions in the current-dollar estimates and because capital gains and losses of unincorporated affiliates that were formerly included have been removed back to 1978. Estimates prepared by the previous procedure have not been published before for 1980; they are shown here to indicate the effect of procedural changes on the 1980 estimates.

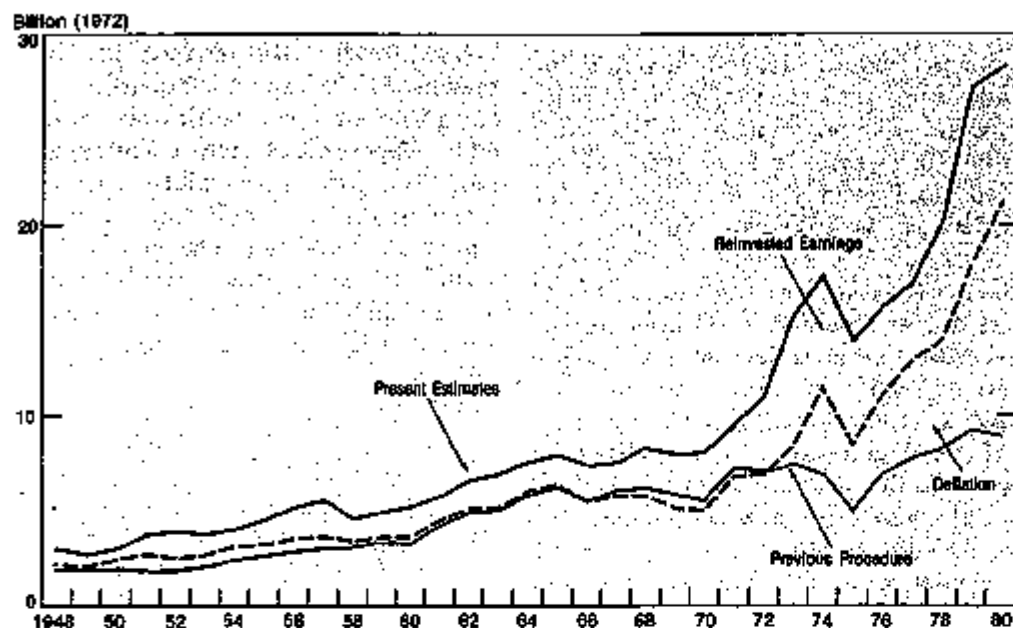
had omitted reinvested earnings of incorporated affiliates until June 1978.

The net inflow of reinvested earnings is now included in the international flow of property income and hence in GNP, NNP, and NI. If a U.S. parent (corporation, individual, or other entity) has, say, a 15-percent equity interest in a foreign corporation, it is credited with 15 percent of the reinvested earnings (measured net of foreign income taxes).

These earnings should be included in international income flows for conformity with both the factor nationality and national gain concepts. As a result of the change, the coverage of the income flows now corresponds rather closely to that needed for conformity with the national gain concept. Although measurement of taxes remains an important difference from the factor nationality concept, the coverage is closer to that concept than previously.

CHART 4

Net Inflow of Factor Income From Abroad in Constant Dollars, 1948-80



U.S. Department of Commerce, Bureau of Economic Analysis

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However, the series on international flows of property income remain defective for use in measuring national income and product in that reinvested earnings corresponding to dividends received by portfolio investors (those owning less than 10 percent of a foreign corporation) are still omitted.¹⁶ In addition, the series used to measure earnings of both incorporated and unincorporated foreign affiliates exclude the inventory valuation and capital consumption adjustments. Capital gains and losses are, properly, omitted, but only beginning with 1978. Before 1978, only losses of foreign affiliates from expropriations or nationalizations were omitted.

Deflation.—All approaches described—consistent with either the factor nationality or the national gain concepts—call for use of a general price index to deflate the international factor income flows. By one approach it would be necessary to obtain real GNP, NNP, and NI, respectively, by deflating the

international flows by the domestic product price deflator for the corresponding series. However, the three deflators are similar and it is inconvenient to have three insignificantly different deflated series for the same international income flow. Accordingly, one deflator—that for net domestic product—is used in constructing all three.¹⁷

Prior to the comprehensive revision of the NIPA's, factor income from abroad was deflated by an implicit price deflator for imports (covering goods and some services) and factor income to abroad was deflated by a similar deflator for exports. This procedure had been adopted as an expedient when BEA first introduced a series for deflated GNP in 1951. Because import and export price indexes have diverged since 1972, this procedure introduced

17. Use of the deflator for net domestic product corresponds to the recommendation of G. Staveland ("Asset Revolution and Terms of Trade Effects in the Framework of the National Accounts," *The Economic Journal* 69 (June 1959): 382-84). Most other writers cited in "Deflators for Deriving Command Series" in the appendix have not discussed the deflation of factor income separately from that of net exports, and then only in the context of deflating series corresponding to command rather than production.

large differences between current- and constant-dollar net inflows of factor income that are not consistent with any appropriate price index.

Comparison of previous and present procedures

In chart 4, the estimates of net factor income from abroad obtained by the previous and present procedures are compared. From 1937, the first year for which reinvested earnings of incorporated affiliates have been separately estimated, through 1971, their addition increased NI in current dollars by 0.3 percent or less (table 3, column 4).¹⁸ From 1972 through 1980, the increase was 0.4 percent or more, reaching 0.7 percent in 1978 and a maximum of 0.8 percent, or \$15 billion, in 1979.

The net inflow of factor income in constant dollars is changed not only by the addition of net reinvested earnings but also by the new deflation procedure. Up to 1972, the combined effect of these changes was to raise NI in constant (1972) dollars 0.4 percent or less except in 1957 (column 10). From 1973 through 1978, real NI was raised 0.8 to 1.1 percent. In 1979 and 1980 it was raised 1.5 percent and 1.7 percent, respectively. Of the 1980 difference of \$19.5 billion in 1972 dollars, \$12.4 billion results from changing the deflation procedure and \$7.1 billion from the addition of reinvested earnings, deflated by the new procedure (columns 6 to 8). Because the changes in the real inflow of factor income are the same for GNP and NNP as for NI in absolute amount, but the levels of these series are higher, percent changes in real GNP and NNP are smaller than those in real NI.

18. The addition of the inflow of reinvested earnings begins with 1937; from 1937 to 1940 it did not exceed \$150 million in any year. Deduction of the outflow begins with 1940, when it was \$21 million. Estimates for preceding years back to 1930 were omitted for lack of information.

Reinvested earnings have always been included in the 1919-20 estimates. (U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce, *The United States in the World Economy*, Economic Series, no. 23, Washington, D.C.: U.S. GPO, 1943, pp. 103, 212, 214.) The addition of reinvested earnings in the post-World War II years makes national income and product totals for those years comparable to those for 1929, with which they are often compared.

16. For further explanation of the distinction between direct and portfolio investments, see Christopher L. Bach, "U.S. International Transactions, First Quarter, 1978," *SURVEY OF CURRENT BUSINESS* 58 (June 1978, Part II): 12-14.

Deflation of Merchandise Trade and Services Other Than Factor Income

THE previous part of this article described the procedure used in the deflation of international flows of factor income. This part describes the procedure used for the remaining components of exports and imports of goods and services. Although a number of improvements were introduced in the recent comprehensive revision of the NIPA's, deflation of these components remains less than satisfactory because appropriate price data are not available.

Merchandise trade

Constant-dollar estimates of merchandise trade are derived by deflating current-dollar values for end-use categories of exports and imports by the Census Bureau's unit value indexes for those categories, and the quotients are added to obtain total exports and total imports.¹⁹ The end-use categories—six for exports and seven for imports—are essentially market-category groupings (see NIPA tables 4.3, 4.4, and 7.17 in this issue).

The change in unit value for each end-use category is an average of unit value changes for detailed commodities, which total about 1200 for exports and 700 for imports. The unit value of a commodity is obtained by dividing the total value of exports or imports of the commodity by the quantities, such as bushels, tons, or numbers of units, exported or imported. If the quantities and values referred to commodity classifications sufficiently detailed to correspond to products as defined for specification pricing, the unit values would be true price indexes. The Census Bureau classification, although detailed, does not approach this level of refinement. Consequently, changes in average value for a commodity often are the result of a combination of price change and vari-

ation in product mix, and the unit value indexes are imperfect measures of price change. The amount by which they differ from price indexes over any period, and even the direction of the difference, is unknown. Further, unit values are not available for all commodities, either because quantity data are not available from Census Bureau records or because the commodities consist of such a mixture of unlike items that computed unit values would be erratic. The weight of commodities for which unit values are not available is usually assigned to other commodities in the same 5-digit commodity group.²⁰

Apart from the fact that the unit value indexes are imperfect measures of price change, the procedure by which they are combined to arrive at the total export and total import components of GNP in constant dollars is not wholly appropriate. When, as in the case of an end-use category, a GNP component that is separately deflated and the price index that is applied to it cover more than one product, the price index should be a Paasche (given-year-weighted) index in which 1972 is the base year and all other years—whether they precede or follow 1972—are "given" years. (Most price indexes are not of this type; aside from merchandise trade, they are usually Laspeyres indexes.) In the case of merchandise trade, the Census Bureau calculates an annual percentage change in unit value for each end-use category by the Fisher ideal index formula, which is the geometric mean of a Laspeyres index and a Paasche index. The annual percentage changes are then linked to obtain a continuous series for the end-use category, expressed with a base year equal to 100.

BEA expects to substitute price indexes being developed by the Bureau of

Labor Statistics (BLS) for unit value indexes when coverage of the price indexes is sufficient. Coverage of the BLS indexes has been progressively increased, and, at the end of 1980, extended to indexes representative of categories of commodities that cover about 62 percent of the value of exports and 49 percent of the value of imports, based on 1975 values. Piecemeal substitution for particular commodity categories is difficult because of differences in classification among the Census Bureau, BLS, and BEA data.

Services

If factor incomes are excluded, services were 16 percent of exports and 14 percent of imports in 1980. Procedures for deflating passenger and freight transportation are reasonably appropriate and were not changed in the recent NIPA revision. Thus, payments for and receipts from passenger fares are deflated by price indexes that use the numbers of travelers in the various routes and areas as weights for series for average fares derived from BEA surveys of travelers and published fares. Freight charges and port expenditure payments in the base year are moved by volume indexes that combine the quantities of freight in broad categories by use of base-year value weights; information is provided by the Census Bureau.

Travel expenditures by foreigners in the United States, formerly deflated by the U.S. Consumer Price Index for services, are now deflated by an average of indexes for the principal items that travelers buy. Expenditures by Americans in each foreign country continue to be deflated by the consumer price index of the country in which expenditures are made, adjusted for exchange rate changes.

Transfers under U.S. military sales contracts, an export component, are now deflated, by commodity groups, by implicit price deflators developed by BEA for deflation of national defense purchases, starting with 1972. Also starting with 1972, exports of miscellaneous U.S. Government services are

19. There are two exceptions to this statement. Census Bureau unit value data are not used for gold or for aircraft exports. See Edward J. Denison and Robert P. Parker, "The National Income and Product Accounts of the United States: An Introduction to the Revised Estimates for 1929-80," *Survey* 60 (December 1980): 6 and 7, for an explanation.

20. For further explanation of Census Bureau procedures, including those discussed subsequently, see *Indexes of U.S. Exports and Imports by Economic Classes: 1913 to 1971*, U.S. Department of Commerce, Bureau of the Census, Washington, D.C.: U.S. GPO, 1971, appendix A.

now deflated by the deflator for U.S. Government sales of services. Prior to the revision, both these Government components had been deflated by the deflator for merchandise exports.

For the miscellaneous groups, representing about 4 percent of total 1980 exports other than factor services and 1 percent of corresponding imports, there is no directly relevant price information. These groups are deflated by the gross domestic product deflator. About one-half of the exports and one-sixth

of the imports consist of fees and royalties paid between affiliates. Before the recent revision, these components were deflated like factor incomes—exports by an import deflator and imports by an export deflator. The procedure was changed for the same reason as that for factor income. The remaining exports of miscellaneous services were formerly deflated by the implicit deflator for other exports, and the remaining imports of miscellaneous services by the implicit deflator for other imports.

Appendix

Deflators for Deriving Command Series

Whether, in the calculation of series like command, net exports should be deflated by import or export prices has been the subject of lively discussion. The choice actually has little influence on the U.S. estimates of command because net exports in current prices are such a small percentage of the total value of production. Even in 1980, when the difference between indexes of export and import prices was largest, use of export prices instead of import prices would change command in 1972 dollars (GNP basis) by only 0.2 percent and its growth rate from 1972 to that date by only 0.03 percent. This is fortunate because the choice necessarily is rather arbitrary, as is always the case when a monetary flow that does not correspond to a flow of real goods or services is deflated.

Advocates of the use of import prices have expressed their case in two related ways. First, net exports in current prices are visualized as adding to (if positive) or subtracting from (if negative) a country's ability to pay for imports in the future; hence, it is argued, import prices should be used to deflate the balance. Advocates expressing their case in the second way rely on the fact that deflation of net exports by import prices is the same as deducting gross imports deflated by import prices from gross exports deflated by import prices. William L. Abraham, for example, writes: "What is the real value of exports? . . . [It] is not the quantity of exports, but the quantity of imports which can be bought with the export

earnings. The value of exports in constant prices in this sense is obtained by dividing the current value of exports not by an export price index, but by an import price index. . . ." (*National Income and Economic Accounting*, Englewood Cliffs, N.J.: Prentice Hall, Inc., 1969, pp. 119-120).

The origin of the convention of deflating the net balance by import prices has been attributed by A. L. Bowley (*Studies in the National Income, 1924-1938*, Cambridge: Cambridge University Press, 1944 ed., p. vi) to J. L. Nicholson. Nicholson later advocated this procedure in "The Effects of International Trade on the Measurement of Real National Income," a paper delivered at the 1959 conference of the International Association for Research in Income and Wealth, Portoroz, Yugoslavia, 1959. The Economic Commission for Latin America used a procedure equivalent to this (the third formula in footnote 5), and it has been endorsed by Richard Stone (*Quantity and Price Indexes in National Accounts*, Paris: Organisation for European Economic Cooperation, 1956, p. 95), Walter S. Salant ("Trade Balances in Current and Constant Prices When the Terms of Trade Change: Questions About Some Eternal Truths," in *Breadth and Depth in Economics*, ed. Jacob S. Dreyer, Lexington, Mass.: Lexington Books, D. C. Heath and Company, 1978), and, in 1968, by the United Nations Statistical Office (*A System of National Accounts*, Studies in Methods, ser. F., no. 2, rev. 3, United Nations, 1968, p. 53).

It is sometimes argued that export prices should be used instead of import prices. In contrast to advocates of the use of import prices, advocates of this view visualize net imports in current prices as adding to (if positive) or subtracting from (if negative) a country's liability to provide future exports to pay for present imports.

R. C. Geary and R. W. Burge advocated a compromise between these views: use of an import price index when net exports are positive and an export price index when they are negative (Geary, in "Introduction," p. 5, and Burge, in "Deflation Within an Accounting Framework: with Reference to Australian Data," p. 18, both in *Studies in Social and Financial Accounting, Income and Wealth*, ser. 9, ed. Phyllis Deane, International Association for Research in Income and Wealth, London: Bowes and Bowes, 1961). However, as Salant has pointed out to the author, because an accumulation of assets can be used either to increase future imports or reduce future exports, and an accumulation of liabilities can be liquidated by either reducing future imports or increasing exports, it is not clear why the deflator should depend upon the sign of net exports.

Yoshinasa Kurabayashi ("The Impact of Changes in Terms of Trade on a System of National Accounts: An attempted Synthesis," *Review of Income and Wealth* 17, September 1971: 285-97, and "Terms of Trade Effect, Productivity Change, and National Accounts in Constant Prices—Reply and Further Comments," *Review of Income and Wealth* 18, September 1972: 327-31) and Raymond Courbis ("Comment on Y. Kurabayashi: The Impact of Changes in Terms of Trade on a System of National Accounts," *Review of Income and Wealth* 18, June 1972: 247-50, and "Terms of Trade Effect, Productivity Change, and National Accounts in Constant Prices—A Further Comment," *Review of Income and Wealth* 18, December 1972: 421-27) advocate a different compromise: use of the implicit deflator for exports and imports combined. There are still other possibilities. Solomon Fabricant sug-

gests use of the implicit price deflator for gross domestic capital formation ("Notes on the Deflation of National Accounts," in *Studies*, Deane, p. 51). G. Stuvell is sometimes said to have favored use of the net domestic product deflator, but he was discussing the deflation of national accounts tied to the production concept, rather than the derivation of a command series ("Asset Revaluation and Terms of Trade Effects in the Framework of the National Accounts," *The Economic Journal* 69, June 1959: 283).

The main text of this article develops two propositions with regard to production and command: (1) Both production and command measures are needed and (2) for inclusion in GNP, NNP, and NI, which are measures of production, a net export series derived by separate deflation of exports and imports—the present BEA procedure—is appropriate.

Agreement about these propositions is not unanimous. It has sometimes been proposed that only a command series be calculated and that it be used to measure production. (For example, see Solomon Fabricant, "Capital Consumption and Net Capital Formation," *A Critique of the United States Income and Product Accounts*, Studies in Income and Wealth, vol. 22, Princeton: Princeton University Press for the National Bureau of Economic Research, 1958, pp. 446-47.) Under such a proposal, the events in the arithmetic example in the main text would be described by stating that, although production of wheat was unchanged, the country's production fell because its terms of trade deteriorated. An increase or reduction in production, measured by this method that results from a change in the terms of trade is labeled the "trading gain or loss." R. W. Burge ("Deflation," p. 20) and R. C. Geary ("Productivity Aspects of Accounts Deflation: Data for Ireland," p. 37, both in *Studies*, Deane) measured Australian and Irish production, respectively, in this way. The trading gain, as they recognized, cannot be allocated by industry or sector.

G. Stuvell states that "Almost without exception national-accounts statisticians have taken the view that only

commodity flows can be deflated, i.e., revalued at the prices of a common base period, since all other items in the system of national accounts, such as transfers, saving, and lending, have no specific price attached to them." Consequently, he says, deflation has been confined to production accounts, and exports and imports have been separately deflated ("Asset Revaluation and Terms of Trade Effects in the Framework of the National Accounts," *The Economic Journal* 69, June 1959: 282). William I. Abraham also says most countries deflate exports by export prices and imports by import prices (*National Income*, p. 119). R. C. Geary, however, states that "most workers in this field reject" the separate deflation of exports and imports. "The view taken is that" net exports should be deflated separately, "giving real national income something of an economic welfare connotation" ("Introduction" in *Studies*, Deane, pp. 4-5).

A 1979 report of the Statistical Office of the United Nations Department of International Economic and Social Affairs (*Manual on National Accounts at Constant Prices*, ser. M, no. 64, pp. 7-8) argues that producers of national accounts should provide constant price series only for flows of goods and services—in this case exports deflated by export prices and imports by import prices. The report recommends leaving deflation of monetary flows to users of the data since there is no single correct deflator for them.

The Economic Commission for Latin America (ECLA), when Raul Prebisch was its Executive Secretary, emphasized the distinction between series that do or do not reflect changes in the terms of trade, but the terminology it used for the series varied over time. The *Economic Survey of Latin America, 1951-52* used the term "output" to describe what BEA calls gross domestic product, a series that is not affected by the terms of trade. It used "gross product" to describe the command counterpart to gross domestic product, which does take into account changes in the terms of trade. The *Economic Survey of Latin America, 1955* changed the terminology. "Gross product" in that *Economic Survey* meant what BEA

calls gross domestic product, and "gross income" was used to designate the command counterpart to it. This practice was continued through the survey for 1966 except that, beginning with the *Economic Survey* for 1964 or possibly earlier, net factor income from abroad was included in gross income so the series was the command counterpart to GNP rather than to gross domestic product. After 1966, series corresponding to command were omitted from the tables, although the text for 1967 did refer to a divergence between "domestic product" and "real income" due to changes in the terms of trade.

ECLA referred to the difference between the two types of series as the "terms of trade effect," described as the "gain or loss resulting from changes in the terms of trade relative to the base year. . . . It has been calculated as the product of exports of goods and services expressed in prices of the base year" and the change "since the base year in the index of the terms of trade (the ratio of the unit value index of exports to that of imports); or, what amounts to the same thing, as the difference between the value of exports of goods and services deflated by the import price index and the same value deflated by the export price index." (United Nations, *Economic Survey of Latin America 1955*, p. 20.)

G. Stuvell in 1959 ("Asset Revaluation," p. 287) followed ECLA practice at that time of distinguishing "real product" from "real income." Use of "national product" for series that do not reflect changes in the terms of trade and "national income" or "income" for series that do reflect them is still encountered today, especially among foreign trade economists. Walter S. Salant ("Trade Balances," in Dreyer, *Breadth and Depth*) is a recent example. Earlier ones are Abraham (*National Income*) and Fritz Machlup ("The Terms-of-Trade Effects of Devaluation Upon Real Income and the Balance of Trade," *Kyklos*, fasc. 4, 1956, pp. 441-42). But in the context of the national economic accounts, the practice is confusing because these names have been preempted to distinguish between market price and factor cost output measures.